RULE 1173 COMPLIANCE PLAN EVALUATION

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FACILITY ID 131003

BACKGROUND

BP West Coast Products LLC (BP) has submitted A/N 527965 for amendment and re-issuance of its Rule 1173 Compliance Plan. Under this application BP provides an update of atmospheric Pressure Relief Devices (PRD)s which are subject to, or exempt from, monitoring requirements under Rule 1173(h). An inventory of atmospheric PRD is provided in the attached tables and includes the following: Table I - Rule 1173 PRDs Removed Since Previous Plan Submittal; Table II - Rule 1173 RPDs Scheduled for Connection to Control System; Table III – PRDs Exempt from Requirements of (h)(1)(A) – (h)(1)(F), by (h)(1)(G); and Table IV – PRDs Subject to Rule 1173(h)(1). The changes to the inventory under this application include elimination of 12 atmospheric PRDs, which previously were subject to monitoring requirements under 1173(h). These atmospheric PRDs are listed in Table I - Rule 1173 PRDs Removed Since Previous Plan Submittal in the current plan and thus have been eliminated from Table IV – PRDs Subject to Rule 1173(h)(1) in the previous plan. This Rule 1173 Compliance Plan supersedes the plan approved under A/N 510012, which was issued on June 24, 2010. BP has provided the following reasons why the aforementioned 12 atmospheric PRDs will no longer be subject to monitoring requirements: 1) the atmospheric PRD has been tied into flare; 2) the fraction of VOC in liquid served is less than 10% by weight; 3) the atmospheric PRD has been tied to closed vent system; and 4) the atmospheric PRD has been removed from service. Thus, 401 atmospheric PRDs are currently required to be equipped with monitoring systems. In the plan approved under A/N 510012, 413 atmospheric PRDs were required to have electronic monitoring. Additionally, the current inventory updates the parameter used in electronic monitoring (Table IV). In the previous plan, the parameter monitored was listed as "Acoustic and/or Pressure" for each atmospheric PRD. In the updated plan, the parameter monitored is identified as "Acoustic" or "Acoustic and/or Pressure."

Rule 1173 – Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants, as most recently amended on February 6, 2009, requires that atmospheric PRDs be continuously monitored by installation of tamper proof electronic valve monitoring devices capable of recording the duration of a release and the amount (mass) of compounds released. Subsection 1173(h)(1)(B) requires that all monitoring devices be installed by July 1, 2010. The

installation dates for enhanced monitoring devices at the BP were listed in plan approved under A/N 510012 (Table IV – PRDs Subject to Rule 1173(h)(1)). In each case, it was indicated that the enhanced monitoring devices would be installed no later than July 1, 2010.

BP now affirms that all atmospheric PRDs, subject to the monitoring requirement under Rule 1173(h), have been equipped with electronic process parameter monitors (see attached e-mail message from Maxine Sauer of BP, dated November 17, 2011). For most atmospheric PRDs, acoustic monitors are used to estimate the release duration. However, BP indicates that in some cases acoustic monitors may not be effective. For these cases, BP has installed tamper proof wireless pressure monitors to estimate release duration. Additionally, BP's submittal indicates that there are no atmospheric PRDs currently scheduled for connection to a control system. Thus, no atmospheric PRDs are listed in Table II. Finally, BP indicates there has been no change in the atmospheric PRDs exempt from monitoring requirements under 1173(h)(1)(G). Thus, in the revised inventory there is no change in the atmospheric PRDs listed in Table III.

It should be noted that BP's submittal includes two inventories of atmospheric PRDs. Both inventories consist of tables designated as Tables I, II, III and IV. However, BP has requested that one set of tables (with notation "BP Confidential") be handled as confidential, while the other set (with notation "BP Non-Confidential") may be disclosed to another party. BP requests that trade secret privilege be granted for the confidential list.

RULE 1173 REQUIREMENTS

The regulatory requirements for atmospheric PRDs under Rule 1173 are outlined in the following table.

Rule 1173(h)(1): Install tamper proof electronic valve monitoring devices capable of determining the duration of release and the quantity of compounds released from atmospheric PRDs.	
Subsection	Requirements
(A)	For refineries with less than 50 atmospheric PRDs, install monitoring devices on 50% of all atmospheric PRDs by January 1, 2009 and install monitoring devices on the remaining atmospheric PRDs by July 1, 2009.
(B)	For refineries with more than 50 atmospheric PRDs, install monitoring devices on 20% of all atmospheric PRDs by January 1, 2009, install monitoring devices on 40% of atmospheric PRDs by July 1, 2009, and install monitoring devices on the remaining atmospheric PRDs by July 1, 2010.
(C)	This subparagraph requires the operator to continue to monitor atmospheric PRDs by use of electronic process control instrumentation that allows for real time continuous parameter monitoring or telltale indicators, until such time as compliance is demonstrated with requirements under subparagraph (h)(1)(A) and (h)(1)(B).
(D)	This subparagraph allows the operator to delay installation of tamper proof electronic valve monitoring devices to no later than the next scheduled turnaround

	following June 1, 2007, for that unit's PRDs. The operator must demonstrate to the District that installation at an earlier date is not feasible or results in a safety hazard.
(E)	This subparagraph allows the operator to use tamper proof electronic valve monitoring devices in combination with continuous parameter monitoring, or tamper proof electronic valve monitoring devices in combination with telltale indicator, which together can record the duration of each release and the quantity of compounds released. The operator is required to demonstrate that the combination of tamper proof electronic valve monitoring devices, continuous parameter monitoring, or telltale indicator represents the actual process conditions at the location of the PRD release to the atmosphere.
(F)	This subparagraph exempts atmospheric PRDs, which are connected in such a way as to direct all gases and vapors that can be released to a VOC vapor recovery or control system, from requirement for installing tamper proof electronic valve monitoring devices. This connection must be done no later than the next scheduled turnaround after December 31, 2008 for that process equipment or unit associated with the atmospheric PRDs. The operator is required to submit a revised plan to the District no later than December 31, 2008 which identifies the atmospheric PRDs and the schedule for connecting them to a VOC recovery/control system. Until they are connected to a recovery/control system, the operator is required to monitor these atmospheric PRDs by electronic process control instrumentation that allows for real time continuous parameter monitoring or telltale indicators.
(G)	This subparagraph exempts atmospheric PRDs which are in liquid service and release to drains subject to Rule 1176 from installation of tamper-proof electronic valve monitoring devices. However, the operator is required to demonstrate that the liquid released meets the definition of "heavy liquid."

RULE 1173 COMPLIANCE PLAN AND EVALUATION

As required by Rule 1173 and the Rule 1173 Compliance Plan approved under A/N 510012, BP has submitted A/N 527965 with an updated inventory of atmospheric PRDs which are subject to, or exempt from, the requirement for installation of electronic monitoring devices. This latest inventory shows that 401 atmospheric PRDs are subject to monitoring requirement. The inventory separately lists 12 atmospheric PRDs which were subject to monitoring requirement under the previous plan (A/N 510012). The compliance date of July 1, 2010, for installation of electronic monitoring devices on all atmospheric PRDs, has passed. Thus, all atmospheric PRDs subject to the monitoring requirement under this rule must now to be equipped with these monitors. These are listed in Table IV of the inventory.

As required under subparagraph 1173(h)(4), Table IV identifies the atmospheric PRDs and includes the PRD identification number, size, location, and the parameter monitored electronically. Other information, including PRD set pressure, is listed in the more detailed "BP Confidential" table.

RULE ANALYSIS

Rule 1173(h)(1)(A) and (B): Compliance Schedule

These sections require that a facility with more than 50 atmospheric PRDs, as is the case for the BP Carson Refinery, equip all of its atmospheric PRDs with electronic valve monitoring devices by July 1, 2010. The Rule 1173 Compliance Plan approved under A/N 510012 listed dates for installation of enhanced monitoring devices. The latest date listed is July 1, 2010. As affirmed in BP's e-mail to the District of November 17, 2011, all atmospheric PRD requiring monitoring have now been equipped with enhanced monitoring devices. Thus, compliance with schedule requirements has been achieved.

Rule 1173(h)(1)(C): Monitoring with Process Instrumentation or Telltale Indicator

This subparagraph requires that atmospheric PRDs be monitored by electronic process control instrumentation or telltale indicators, until electronic valve monitoring devices are installed. This requirement is no longer applicable, as all atmospheric PRDs subject to the monitoring requirement are now equipped with electronic valve monitoring devices.

Rule 1173(h)(1)(D): Alternate Schedule for Installing Electronic Monitoring Devices

This subparagraph gives the facility the option of delaying the installation of electronic valve monitoring devices until the first turnaround after June 1, 2007 for that process unit's PRDs. BP has not selected an alternate schedule for compliance with installation of electronic valve monitoring devices. This subparagraph is no longer applicable, as all atmospheric PRDs subject to the monitoring requirement are now equipped with electronic valve monitoring devices.

Rule 1173(h)(1)(E): Use of Electronic Valve Monitoring Devices in Combination with Continuous Parameter Monitoring or Telltale Indicator

This subparagraph allows the use of electronic valve monitoring devices in combination with continuous parameter monitoring or telltale indicators. The operator must demonstrate that a combination of devices represents actual process conditions at the location of PRD release to the atmosphere. In BP's e-mail to the District on November 17, 2011, it is indicated that the duration of PRD release is estimated either by an acoustic monitor, or by a tamper proof wireless pressure monitor. BP indicates that acoustic monitors do not work on certain PRDs, due to many factors. For these cases, tamper proof wireless pressure monitors have been installed to estimate release duration. BP also monitors the process pressure of devices fitted with atmospheric PRDs. Process pressure, in combination with process temperature, process stream molecular weight, VOC content of the process stream, valve size, valve specific coefficients, and the duration of PRD release are used to calculate the amount of material

released. The calculation formulas remain the same (from American Petroleum Institute (API) RP 521 Section 3.6.2.1.1).

PRD Equation for Vapor or Gas Service

$$W_s = \frac{(ACK_d K_b K_c)(P+14.7)}{3600\sqrt{\frac{(T+460)Z}{M}}}$$

Wvoc = Ws * VOC * t

$W_{TVOC} = \sum$ Wvoc

Where:

A = Relief Valve Orifice Size

$$C=Sizing\ Coefficient = 520\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{k+1}{k-1}}}$$

k = Cp/Cv = Specific Heat Ratio for the released gas
Kd = Effective Coefficient of Discharge (use Kd = 0.975 in absence of manufacturer's PRD specific data)
Kb = Capacity Correction Factor
Kc = Combination Correction Factor. (Kc =1 if no rupture disk; Kc = 0.9 if rupture disk)
M = Molecular Weight of the released gas
P = Pressure (psig), as measured with Process Pressure Monitoring System
T = Temperature (°F)
t = Recorded Duration of Release in Seconds by Electronic Monitoring Device
VOC = weight percent VOC in the released gas
Ws = Flow through the PRD, lb/sec
Wvoc = Flow of VOCs through the PRD
W_{TVOC} = Total VOC Released during the Event, lbs
Z = Compressibility Factor

PRD Equation for Liquid Service

$$Q = 0.63AK_dK_wK_v\sqrt{\frac{P}{G}}$$

M = Q*8.34*G*t

Q = flow rate, (U.S. gallon per second)
Kd = Rated Coefficient of Discharge (use Kd = 0.65 in absence of manufacturer's PRD specific data)
Kw = Capacity Correction Factor (Kw = 1 for atmospheric back pressure)
Kv = Correction Factor due to Viscosity (assume = 1)
P = Pressure (psig), as measured with Process Pressure Monitoring System
G = Specific Gravity of the liquid at flowing temperature
M = Release per Event in lbs
t = Recorded Duration of Release in Seconds by Electronic Monitoring Device

Mair = M – Md - Mr

Where

Mair = lb of emissions released into the air from liquid PRDs

Md = lb of liquid recovered from drain. The operator may use the volume and the density of the liquid to determine the mass of the liquid recovered, or direct

weight scale measurement. The amount of liquid recovered shall not include cleanup material, absorbent, and cleaning solution, or any material other than the liquid released by the liquid PRD.

M_r = lb of liquid recovered by cleanup crew. The operator may use the volume and the density of the liquid to determine the mass of the liquid recovered, or direct weight scale measurement. The amount of liquid recovered shall not include cleanup material, absorbent, and cleaning solution, or any material other than the liquid released by the liquid PRD.

For each PRD release event, it shall be assumed that the PRD is fully open for the duration of the release recorded by the monitoring device. Any alternative in determining the release duration or quantity shall be evaluated and approved in writing by the District.

If the operator wants to determine the amount of emissions for a release from a PRD event by excluding the amount of liquid recovered, the operator shall maintain records of the weight of the excluded materials as defined by M_d and M_r

Rule 1173(h)(1)(F): Atmospheric PRDs Exempt from Monitoring Due to Connection to Vapor Recovery/Vapor Control System

This section exempts atmospheric PRDs which have been connected to a vapor recovery/vapor control system, from installation of electronic valve monitoring devices. BP's submittal indicates that there are no additional atmospheric PRDs currently scheduled for connection to a vapor recovery/vapor control system. Thus, no atmospheric PRDs are listed in Table II. BP has however completed the connection of 5 PRDs (as listed in Table I) to a flare or to a closed vent system. Thus, there are no additional applicable requirements under this section.

Rule 1173(h)(1)(G): Atmospheric PRDs Exempt from Monitoring Due to Being in Heavy Liquid Service and Releasing to Drains Subject to Rule 1176

This section exempts atmospheric PRDs which are in heavy liquid service and which release to drains subject to Rule 1176, from installation of electronic valve monitoring devices. The atmospheric PRDs at BP which are covered under this exemption are listed in Table III. BP's submittal indicates that there is no change in this list, from what was listed in Table III of the previous compliance plan (approved under A/N 510012). Thus, there are no additional applicable requirements under this section.

RECOMMENDATIONS

Issue the Rule 1173 Compliance Plan with the conditions listed below. This plan approval omits conditions from the previous plan approval (under A/N 510012), which are outdated or otherwise no longer applicable, such as:

- requirement for utilization of "Pipe End Cover" on atmospheric PRDs prior to installation of the Electronic Valve Monitoring System (EVMS) - as all atmospheric PRDs subject to monitoring requirement are now equipped with EVMS.
- requirement for monitoring all atmospheric PRDs listed in Table II (atmospheric PRDs scheduled to be connected to a closed vent system) with electronic process control instruments that allow for real time continuous parameter monitoring or telltale indicator, prior to connection to closed vent system - as there are no atmospheric PRDs currently scheduled to be connected to a closed vent system (i.e. no PRDs are listed in Table II).

1. The operator shall install and operate atmospheric PRD monitoring systems in accordance with all data and specifications submitted with the application under which the plan is approved, unless otherwise specified below. A current list of PRDs is provided in the attached tables.

2. All 401 atmospheric PRDs subject to Rule 1173(h)(1)(B), as listed in attached Table IV, shall be equipped with electronic valve monitoring devices after July 1, 2010.

3. The operator shall use a Continuous Valve Monitoring System (CVMS), which shall include a process pressure monitoring and recording system and an electronic valve monitoring device, to determine and document the release duration and quantity from each PRD.

4. The CVMS shall be defined to include electronic valve monitoring devices (acoustic and/or pressure), process pressure and temperature sensors or transmitters, receivers, and the data acquisition and recording systems. Continuous recording shall be defined as the recorded pressure readings and electronic valve monitoring readings at a minimum of one minute intervals (more frequent if a release detected). The data recording system shall be accurately synchronized with the time and date of the measurement.

5. The operator shall ensure that the CVMS for each atmospheric PRD is properly maintained and kept in good operating condition at all times when the process equipment it serves is in operation, except when it is taken out of service for the following reasons:

   a. Failure, breakdown, or unplanned maintenance of the data acquisition or recording system, which shall not exceed 48 hours cumulatively in any calendar quarter. The operator shall report the time period that the data recording system is out of service in the quarterly report.

b. Planned maintenance of the CVMS, which shall not exceed 7 days in a calendar year, unless the operator has notified the District by e-mail within 24 hours of taking the CVMS out of service, detailing the specific reason for the maintenance. All notifications shall be forwarded to the following e-mail address: refinery_compliance@aqmd.gov.

6. The operator shall use the following equation(s) or other alternative District-approved methodology to determine the Volatile Organic Compound (VOC) emissions from a PRD release. The operator shall submit a plan application in order for the District to evaluate any alternative VOC emissions estimation methodology.

PRD Equation for Vapor or Gas Service

$$W_s = \frac{(ACK_d K_b K_c)(P+14.7)}{3600\sqrt{\frac{(T+460)Z}{M}}}$$

Wvoc = Ws * VOC * t

$W_{TVOC} = \sum$ Wvoc

Where:

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$$C=Sizing\ Coefficient = 520\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{k+1}{k-1}}}$$

k = Cp/Cv = Specific Heat Ratio for the released gas
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M = Molecular Weight of the released gas
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T = Temperature (°F)
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Kw = Capacity Correction Factor (Kw = 1 for atmospheric back pressure)
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Where

Mair = lb of emissions released into the air from liquid PRDs

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weight scale measurement. The amount of liquid recovered shall not include cleanup material, absorbent, and cleaning solution, or any material other than the liquid released by the liquid PRD.

M_r = lb of liquid recovered by cleanup crew. The operator may use the volume and the density of the liquid to determine the mass of the liquid recovered, or direct weight scale measurement. The amount of liquid recovered shall not include cleanup material, absorbent, and cleaning solution, or any material other than the liquid released by the liquid PRD.

For each PRD release event, it shall be assumed that the PRD is fully open for the duration of the release recorded by the monitoring device. Any alternative in determining the release duration or quantity shall be evaluated and approved in writing by the District.

If the operator wants to determine the amount of emissions for a release from a PRD event by excluding the amount of liquid recovered, the operator shall maintain records of the weight of the excluded materials as defined by M_d and M_r

7. The operator shall calibrate and maintain each pressure and temperature sensor and electronic valve monitoring device in accordance with manufacturer's specifications.

8. All components of the CVMS shall be made available to District personnel for inspection, upon request.

9. The operator shall keep adequate records to show compliance with all plan conditions. Such records shall be made available to District personnel upon request. The operator shall maintain records for at least five years.

10. The provisions of this plan will not apply to any PRDs that are determined to be no longer subject to Rule 1173(h), including PRDs that have been removed, tied into a closed system, have been modified so that they fall under the provisions of Rule 1173(h)(1)(G), or are located on equipment which is out of service and is hydrocarbon free. If the operator makes any changes allowed under this condition, the operator shall submit an updated inventory to the District within 12 months, identifying changes to the inventory.